tralia—but he did not seriously take up horticulture again until he landed at Brisbane in 1861 after a spell of gold-digging in Victoria and farming in New Zealand. He then established a seed business in Brisbane, a venture, however, attended with no great measure of success owing to financial conditions in Queensland, but his real opportunity came in 1875, when the Queensland Government appointed a committee to inquire into diseases affecting live stock and plants, and he was chosen to investigate the botanical problems involved. In connection with the duties of this appointment he travelled far and wide throughout the State, and gained that extensive knowledge of the flora of Queensland which enabled him to make his numerous and valuable contributions to Queensland botany.

His earlier work was mainly connected with the native grasses of Queensland, which formed the subject of many articles valuable to the botanist and agriculturist alike. He was next appointed to the charge of the botanical section of the Queensland Museum, and in 1881 was made Colonial Botanist, the post which he held until his death. The duties of this post, which were very congenial to him, he discharged with conspicuous ability and untiring devotion, and, during the times of depression when the post was abolished, he continued his work unpaid until, as a result of general protest, he was reinstated in his former position.

The distinction of C.M.G. conferred upon him in 1911 was a fitting recognition of the value of his botanical and agricultural services to Queensland. His contributions to botany embrace the purely systematic as well as the economic aspects of the subject. Another subject to which he paid particular attention was the medicinal uses of plants.

Among his more important publications must be mentioned "The Flora of Queensland" in seven volumes; "The Handbook of the Ferns of Queensland"; a sketch of the "Economic Plants of Queensland"; "Plants reputed Poisonous and Injurious to Stock"; "Queensland Woods"; "Queensland Grasses," etc.

Bailey also devoted much time and attention, especially in later years, to the study of fungi and algæ, and until a few days before his death he was a regular contributor of critical specimens to the National Herbarium at Kew, which has been greatly enriched, as regards the Queensland flora, by the specimens he so generously presented.

NOTES.

We see from the Transactions of the Royal Scottish Arboricultural Society (of which he is the honorary editor) that Dr. A. W. Borthwick, lecturer in forest botany in the University of Edinburgh, has been appointed by the Board of Agriculture for Scotland to be the advisory officer of the Board for forestry in succession to the late Dr. John Nisbet.

We learn that the nineteenth International Congress of Americanists, which was to have been held in Washington in October next, and which was postponed in consequence of the war, is, according to present arrangements, to take place at Washington on December 27–31 next, in conjunction with the anthropological section of the Pan-American Scientific Congress, the American Anthropological Association, the American Historical Association, the American Folklore Society, and the Archæological Institute of America.

The autumn meeting of the Iron and Steel Institute will be held at the Institution of Civil Engineers on September 23 and 24, when the following papers may be expected to be read and discussed:—Influence of oxygen on some properties of pure iron, W. Austin; note on the carburisation of iron at low temperatures in blast-furnace gases, T. H. Byrom; influence of heat-treatment on the specific resistance and chemical constitution of carbon steels, Prof. E. D. Campbell; effect of chromium and tungsten upon the hardening and tempering of high-speed tool-steel, Prof. C. A. Edwards and H. Kikkawa; phosphorus in iron and steel, Dr. W. H. Hatfield; the magnetic transformation of cementite, Prof. K. Honda and H. Takagi; sulphur in malleable cast-iron, R. H. Smith; iron and nitrogen, Prof. N. Tschischewski.

The council of the Iron and Steel Institute gives notice that at the forthcoming meeting of the institute the following new rule for addition to the existing by-laws will be submitted:—"In the event of a state of war existing between Great Britain and any other country, or State, all members, honorary members, and honorary vice-presidents who shall be subjects of such enemy country, or State, shall forthwith cease to be members, honorary members, or honorary vice-presidents of the institute, but they may, if the council thinks fit, be reinstated after the termination of the war."

The Royal Aero Club announces that the British height record for pilot alone has been granted to Mr. H. G. Hawker, the National Physical Laboratory having reported that the barograph and chart used by the aviator on June 6 showed that the height attained was 18,393 ft. The previous best record was that of 14,920 ft., accomplished by Eng.-Lieut. E. F. Briggs, now a prisoner in Germany.

We deeply regret to record the death in action at the Dardanelles, on August 10, of Second Lieut. H. G. J. Moseley, Trinity College, Oxford, son of the late Prof. H. N. Moseley. Lieut. Moseley was formerly lecturer and demonstrator in physics at the University of Manchester, and holder of the John Harling fellowship for research.

We much regret to learn that Capt. T. P. Black, 9th Sherwood Foresters, registrar of University College, Nottingham, was killed at the Dardanelles between August 7 and 11. He was for a time assistant in physics at the Durham College of Science, Newcastle-upon-Tyne, removing in 1907 to University College, Nottingham, to fill a similar position. In 1911 he was appointed registrar of the college.

We note, with regret, the death, on August 28, at the age of fifty-six years, of Mr. Henry Crookes, the eldest son of Sir William Crookes. He was an associate of the Royal School of Mines, and a fellow of the Chemical Society.

The death is announced of Lieut.-Col. Edward Lawrie, M.B., I.M.S. (ret.), at the age of sixty-nine. Col. Lawrie was educated at Edinburgh University, and after acting as house surgeon to Prof. Syme, whose views probably largely influenced his subsequent work on chloroform anæsthesia, he entered the Indian Medical Service, from which he retired in 1901. During his career he held the posts of resident surgeon of the Medical College Hospital, Calcutta, acting for some time as professor of physiology in the Medical College, professor of surgery in the Lahore Medical College, and residency surgeon at Hyderabad, one of the most important medical appointments in India. He was best known for his views on anæsthesia, being an ardent advocate of the claims of cholorform to be the best and safest anæsthetic for general use. Lawrie held, with his old teacher Syme, that chloroform killed only through the respiration, and not through the heart. As many held the converse opinion, Lawrie prevailed upon the Nizam of Hyderabad to institute and finance a commission to investigate the subject, of which commission Sir Lauder Brunton was president and Col. Lawrie and the late Sir Gerald Bomford were members. Much experimental work was done, which confirmed Lawrie's views, the monkeys dying without exception from failure of respiration, and a valuable report was published; he was also the author of "Chloroform: A Manual for Students and Practitioners" (1901). When the hospitals for the Indian troops were opened at Brighton in December last, Lawrie was appointed anæsthetist, and carried out his duties until the beginning of his fatal illness last May.

Lieut. Ernest Magowan Harper, 7th Batt. Munster Fusiliers, who was killed in action on August 9, at the Dardanelles, was a graduate of Queen's University, Belfast. He was educated at the Royal School, Dungannon, where he gained a reputation for brilliant work, and received his training as a keen sportsman, which afterwards characterised him at the University. On matriculation he entered Queen's with a junior science scholarship, which he held throughout his undergraduate course. In 1913 he graduated bachelor of science with first-class honours in chemistry, and afterwards was appointed to the Andrews research studentship, which he held until the time of his death. During his tenure of this scholarship he conducted extended researches on the connection between the absorption spectra and the constitution of organic nitro-compounds, publishing two papers in the Journal of the Chemical Society. On the declaration of war he applied for a commission and was gazetted last September, being posted to the 7th Munster Fusiliers. He relinquished his post of senior assistant in chemistry in the University, abandoned his scientific career, and gave himself up unselfishly for his country's cause. In his death the country has lost an able officer, and science a most promising young man.

Lieut. Wolfred Reeve Cloutman, R.E., who was killed in action in France on August 21, was an associate of the Royal School of Mines, obtaining his associateship in mining (first class) in 1912, after winning many prizes and completing a most distinguished career at the school, where his death is felt as a serious loss. Mr. Cloutman's work at the Royal School of Mines (an integral part of the Imperial College of Science and Technology) was further recognised by the award to him of the diploma of membership of the Imperial College. On leaving the school Mr. Cloutman was awarded a scholarship by the council of the Institution of Mining and Metallurgy for a post-graduate course in mines or works in various parts of the world. In 1914 the governors of the Imperial College awarded to him the Warrington Smyth prize and medal for a report which he submitted on certain mining operations in Western Australia. As a mining engineer Mr. Cloutman was valuable to the Army, and in June last he was mentioned in despatches for his skill and success in mining operations.

The death is announced, at the age of forty-nine years, of Dr. R. W. Johnstone, a medical inspector of the Local Government Board. Dr. Johnstone had been British delegate at the International Health Office, Paris, a member of the Commission for the Investigation of Mediterranean Fever, chief technical delegate for Great Britain at the International Sanitary Conference at Paris, 1911–12, and plenipotentiary to sign the International Sanitary Convention of Paris in 1912.

The death is reported, in his sixty-fourth year, of Dr. Thomas Bliss Stillman, an American chemist, who had spent the greater part of his career on the staff of the Stevens Institute of Technology, New Jersey. From 1886 to 1903 he was professor of analytical chemistry in that institution, and from 1903 to 1909 professor of engineering chemistry. He was the author of "Engineering Chemistry," first published in 1897, and of various monographs in American and European scientific journals.

Many of our readers, especially among those who attended the meeting of the British Association at Winnipeg in 1909, will be grieved to hear of the death of Mrs. W. H. Thompson, who has recently succumbed to an attack of appendicitis. Mrs. Thompson was an active member of the committee responsible for the arrangements of the Winnipeg meeting. She was for some years a contributor to the work of the Ductless Glands Committee, and published an important paper on the thyroid gland (Phil. Trans., 1910), in addition to contributions to the Trans. of the Royal Society of Canada and other journals. For some years Mrs. Thompson was librarian of the University of Manitoba, and her loss will be keenly felt in academic circles in Canada.

Mr. Bernard Kettle, curator of the Guildhall Museum, reports some interesting finds of Roman pottery from dust-heaps in the City of London. A large series of these was disclosed when the old General Post Office in St. Martin's-le-Grand was demolished. A few whole pots and many fragments of Samian ware were found here, besides building materials, whetstones, beads, knives, coins, and other small objects. Most of these rubbish-pits date between A.D. 50 and 200, and by comparison of datable with undatable specimens much light has been thrown upon the seriation of types. From another rubbish-pit in King William Street nine Samian vessels of the first century have been reconstructed, one of them being a vessel finer than any hitherto found in London, and two specimens of a type hitherto unknown in England. These were associated with a lamp, two coins, and other pottery and bronze objects.

THE novel discovery in the Fayum of a nephrite celt is announced by Mr. Oric Bates in the September issue of *Man*. This specimen is remarkable because its greatest width is not, as in the common Fayum type, along the cord of the cutting edge. The material is a sort of nephrite, composed of minute fibres of actinolite, and in its present form it is of metamorphic origin. The source whence the stone may have been obtained is at present uncertain, and it is impossible to say whether this development of actinolite is due to regional metamorphism or contact metamorphism. At any rate, the rock can only have come from some region where there has been extensive metamorphism of one kind or another.

AN important monograph on the genus Sansevieria, the source of bow-string hemp, occupies seventy-six pages of the current number of the *Kew Bulletin* (No. 5). The account is by Mr. N. E. Brown, who has made a lifelong study of this difficult and highly important economic group of plants. The paper is illustrated by a series of text figures representing the salient features of the different species, and there are two plates of a new species, *S. Dawei*, from Uganda. Fifty-four species in all are described in detail, and a full key is provided which should be of great value in running down the plants. In order that the paper may be of use to the planting community, in whose interests it has largely been prepared, the few technical terms employed are fully explained at the beginning. Africa is the true home of the genus, and East Africa in particular, where it is an important economic product. Only four species are known to occur outside Africa, and they are found in Ceylon, India, Burma, and possibly China. Of the fifty African species only five are natives of South Africa, the rest being confined to the tropical area of the Continent. As considerable doubt still exists as to which species yields the best fibre, it is hoped that the publication of the monograph may help to bring about a solution of so important a question.

BOTANICAL specimens are commonly deprived of all beauty, and much of their value, by the loss of colour in the flower-heads. This very serious drawback has now been removed by the timely discovery of a method of colour-preservation by Dr. C. F. Fothergill, and described in detail in the *Museums Journal* for July. It has the further merit of extreme simplicity. Briefly, Dr. Fothergill employs sheets of absorbent cotton wool, placed in three layers forming two compartments between two "grids," which are made of a "wire mesh-work of half-inch squares with a heavy encircling band." The necessary pressure is obtained by fastening one or two straps, preferably of webbing, around the grids, and tightening them as required. The flowers to be pressed, having been placed in the grid, are then suspended in front of a fire, or in the sun, when this is sufficiently powerful. The explanation of the success of the method is, that the process of drying is so rapid that the pigment is fixed instead of being slowly decomposed. Fresh carnations can be preserved in about seven hours. Primroses picked fresh off the living plant can be permanently dried to retain a lifelike colour in two hours if the press containing them is placed in the oven.

THE first part of vol. v., section 2, of *Flora Capensis* has now appeared, having been prepared at the Herbarium of the Royal Botanic Gardens, Kew. The families dealt with are the Thymeleaceæ, 181 species in twelve genera; the Peneaceæ, 24 species in five genera; the Geissolomaceæ, with the single monotypic genus Geissoloma; the Loranthaceæ, consisting of 42 species in two genera; and the Santalaceæ. This last family, which contains six genera in South Africa, is completed as far as the 112th species of Thesium in the present part.

PROF. G. S. BOULGER has published in the form of a pamphlet, price one penny, his paper on the History of Kew Gardens, read before the South-Eastern Union of Scientific Societies. The paper, though covering a well-explored field, contains several interesting particulars about the early history of the Royal Gardens. A letter from Gilbert White to Robert Marsham about Stephen Hales, written in 1791, which is reproduced, presents a very vivid picture of that ingenious physiologist's versatility in all forms of experiment. The history is brought down to the present day, and an outline of the functions of Kew is given in conclusion.

AT the last monthly general meeting of the session of the Zoological Society of London, his Grace the Duke of Bedford in the chair, it was announced that two Californian sea-lions had been added to the menagerie of the society, thus partially repairing the loss by disease sustained some time ago. Two tortoises, new to the collection, were received on deposit on July 18. One of these is the blackish tortoise (*Testudo nigrita*) from Indefatigable Island, the other Bauer's tortoise (*T. galapagoensis*) from Charles Island. The receipts in gate-money for July showed a decrease of 724*l*. as compared with July of last year. The receipts for admission at the gates during the present year—to the end of July—showed a decrease of 274*l*. as compared with the corresponding period during the last ten years. Having regard to the times, this falling-off in receipts is less than might have been expected.

THE *National Geographic Magazine* for August should attain a phenomenal sale, if only on account of its illustrations, which include no fewer than eighty coloured figures of American game birds, by Louis Fuertes. Both from the point of view of scientific accuracy and artistic merit these are as near perfection as is humanly possible. These illustrations accompany an article on American game birds, by Mr. Henry Henshaw, which should be seriously studied by every field naturalist and sportsman in the British Islands; for the author draws a by no means exaggerated picture of the ravages inflicted by modern firearms on birds of real economic importance, and the need for drastic legislation to prevent their speedy extermination. And there can be no question but that his contentions have their roots deep down in solid fact. In a second article, describing the impressive transformation in the physiography of the country affected by the formation of the huge lake in the Gatun region, during the construction of the Panama Canal, Mr. George Shiras draws a vivid picture of the destruction of animal and plant life which has been inevitable but none the less regrettable. Thickly forested valleys teeming with animal life have now been converted into one vast lake. But the author holds that this area should be converted by the Federal Government into a reservation for the absolute protection of the survivors from this deluge. In course of time, he points out, if this is done, water-fowl of all kinds will find sanctuary here, and serve as a "feeder" for the areas depleted by the sportsman.

IN his presidental address, read at the American Association of Museums, San Francisco, Dr. O. C. Farrington gave an able summary of the origin and evolution of natural history museums, which should be widely read in this country. More especially is this to be urged in view of the danger which threatens such institutions in the immediate future in regard to the policy of national retrenchment which is now in process of formation. There is a danger that the pruning-hook may be used too ruthlessly, thereby inflicting material harm. For reformers are generally enthusiasts, and therefore are to be carefully watched, experience having shown that a sense of proportion is not usually among their attributes. Museums, as he remarks, are even now commonly regarded as a luxury, but he leaves no uncertainty as to the vitally important part which the modern museum plays, and must continue to play, in ever-increasing force, in our national life: widening our outlook and conceptions of existence, and affording to the uninitiated sources of information as to the nature of disease and pestilence, and other aspects of economic zoology which are indispensable to the speeding up of progress and well-being.

IN *La Nature* for August 21, 1915, L. De Launay shows the extent of the recent discoveries of coal-bearing strata in Germany, Belgium, and the Netherlands. Though the ultimate ownership of some of these stores may seem uncertain, there is no doubt as to their importance in the economy of Europe. The explorations have proceeded at depths from 1000 to 1500 metres (nearly 5000 ft.). The Westphalian coalfield has thus been connected with that of south-east Belgium, through the tracing of intermediate fields between Wesel and Aachen. On the east side of the Rhine, moreover, from Essen to Wesel and Haltern, the Westphalian basin has been proved to have a vast extension. West of the Meuse, and south of the innocent lands of Nijmegen, Holland participates in the new discoveries. At the Dutch frontier the coal is within 300 metres of the surface. Since 1901, the Belgian field has been traced far northwards beneath the Cainozoic strata of Limbourg between Brussels and Maastricht, and away west into the province of Antwerp. The results in northern France have been less important, but the total coal resources of the areas dealt with in M. De Launay's article are double those that were known a few years ago. The author cannot resist a suggestion that, "after the war," France should annex the basin of the Saar.

DR. A. WADE's researches on "The Supposed Oil-bearing areas of South Australia" have been published as Bulletin No. 4 of the Geological Survey of the State. Its wise conclusions and scientific thoroughness recommend this report as a model to be followed by explorers. The remarks about those superficial observers who stimulate unprofitable enterprises by saying that "the country is exactly like such-and-such an oilfield" should be read by financial magnates as well as by would-be prospectors.

IN the fifth volume of the Journal of the Natural History and Science Society of Western Australia (Perth, 1914, price 2*s.* 6*d.*), C. G. Thorp (p. 20) reviews the interesting glassy bodies known as Australites, and gives a useful map of their distribution. He regards them as ejected from a volcano or volcanoes in the East Indies, some of them in Tertiary and some in modern times. The blebs of glass now found were attached to bubbles, and were thus carried into the currents of the cirrus-cloud level of the atmosphere. The author has succeeded in obtaining artificial glass bubbles with blebs attached; but some accident seems to have prevented their appearance among his illustrations. He believes that some of the surface-glaze in australites results from fusion while falling through our atmosphere. F. Berwerth, it may be remembered (NATURE, vol. lxxxix., p. 513), used the absence of such signs of fusion in moldavites as an argument against the meteoric theory of their origin, and in this he received support from G. P. Merrill's work on australites. E. W. Skeats describes "three unusual forms of australites" from gravels in Western Victoria (Proc. R. Soc. Victoria, vol. xxvii., 1915, p. 362).

IN a review of "The Origin and Formation of the Diamond" (S. African Journ. Sci., vol. xi., 1915, p. 275), W. Johnson combats the theory that the South African diamonds were formed from carbon dissolved in molten kimberlite, and urges that pressure was the primary factor in their production, at a time when the igneous ground was buried in the crust far more deeply than it is at the present day.

THE Bulletin of the American Geographical Society for August, 1915 (vol. xlvii.), illustrates, in a paper by H. E. Gregory, of Yale, the huge buttes left in the Navajo country by erosion of red Permian sandstones. Wind is still the great enemy in this plateau region, which lies between 4000 and 7000 ft. above the sea. The Colorado River is the only stream that maintains a strong flow throughout the year, and the meteorological records show great variations in rainfall from year to year, but indicate a brief rainy season in July and August. In the same number of the Bulletin, Sidney Powers, of the Hawaiian Volcano Observatory, provides some striking photographs of the lava-lake of Kilauea.

THE mineral and petrographic studies which form a special feature of the American Journal of Science are continued by W. E. Ford (vol. xl., p. 33), who investigates "the relations existing between the chemical, optical, and other physical properties of the members of the Garnet group," and in the following number by N. L. Bowen (*ibid.*, p. 161), who has experimentally investigated the crystallisation of simple types of basaltic and dioritic magmas. Mr. Bowen concludes that the more acid subalkaline igneous magmas are "derived from basic material, being, as it were, successive mother liquors from the crystallization of the basic magmas." Syenite may thus arise as an upper product of differentiation from a large slowly cooled mass of basaltic magma.

THE Canadian Department of Mines has issued recently three memoirs dealing with the coal resources of the Dominion; two are issued by the Geological Survey, namely, "Coal Fields of Manitoba, Saskatchewan, Alberta, and Eastern British Columbia," and "Coal Fields of British Columbia," both by D. B. Dowling, and one is issued by the Mines Branch, namely, "Products and By-Products of Coal," by Messrs. E. Stansfield and F. E. Carter. The two first-named deal more especially with the geology of the coal fields of western Canada, and will be welcomed by all interested in the geology of coal, more particularly because they deal with important coal deposits in relatively recent formations, Cretaceous and Tertiary. The third pamphlet will no doubt appeal to a wider public, its object being to present in a simple and accessible form the various economic applications of coal products, and, in the words of the authors, their "aim has been to give prominence to the commercial rather than to the scientific aspect of the subjects treated." Coke, gas, ammonia, tar, and the derivatives of coal-tar are briefly discussed in turn, and their economic and industrial importance is explained. Under the last head the question of the dye industry is touched upon, and the authors have quoted certain statements of Dr. Bernhard C. Hesse, of New York, which well deserve the widest possible publicity, showing, as they do, a remarkably sane and sound appreciation of the difficulties of the question. He points out that the coal-tar dye industry is not a unit, nor does it even consist of a number of independent units, but "is really a conglomerate of many separate parts acting and reacting upon each other, commercially and industrially"; his final conclusion being "that the whole of this industry cannot be successfully transplanted, and attempts to transplant part only have not resulted in any self-contained and independent industry anywhere."

THE *Monthly Meteorological Charts of the North Atlantic and Indian Oceans* for September, 1915, recently issued by the Meteorological Office, contain much which is of interest to the navigator. There is much else besides the precise detail as to the frequency of wind and current. An inset chart is given on the Atlantic issue showing the distribution of fog and mist over the ocean in September. It is shown that fog is seldom experienced on the steamer tracks in mid-Atlantic during September, and there is never as much as 20 per cent. in that month anywhere over the North Atlantic, as against 30 per cent. near Cape Race in August, and 40 per cent. in July. The Atlantic chart also contains on its reverse charts of the mean salinity and surface temperature of the North Atlantic and of the English Channel. The chart for the Indian Ocean gives graphically details of the ice in the southern hemisphere, also detailed information relative to the results of meteorological observations in the Persian Gulf and the Gulf of Oman.

ACCORDING to an article in the *Scientific American* for August 14, Dr. F. C. Brown, of the physics department of the State University of Iowa, has applied his discovery of the great sensitiveness to light of a selenium crystal as compared with the ordinary selenium film to the production of a "phonopticon" to enable blind persons to read printed matter. The instrument is a simplification and improvement of Dr. Fournier's "type-reading optophone." A box carrying a lamp, and provided with lenses, is moved along the line of print. By this means a short vertical bar of light moves along the line from left to right, and an image of the bar is cast on two or more selenium crystals in such a way that each crystal is covered by a fixed part of the line. Each crystal forms one side of a resistance bridge, which is balanced when the bar of light falls on white paper. Want of balance when the bar covers a portion of a printed letter is detected by a telephone in series with a rotating contact-maker. Each bridge has a contact-maker of a different period, and on listening to the joint effect of the telephones it has been found possible with not more than two telephones to recognise the sequence of sound for each letter of the alphabet.

WHILE the teaching of the calculus is now taken at an early stage in our curricula, the results do not appear to have been altogether satisfactory in America any more than here. We have recently received reprints of a discussion on "Practical Mathematics" opened by Prof. W. S. Franklin and his assistants before the Society for the Promotion of Engineering Education (Bulletin iv., 10, p. 5; Proceedings, xxii., p. 149), and we also have before us Prof. E. B. Wilson's reviews of recent text-books in the Bulletin of the American Mathematical Society for last June (xxi., 9). The failure of the students to profit by the course would appear to be due to the want of rigorous logical reasoning, to the failure to illustrate the subject by concrete physical and other illustrations, and to "the entire absence of suggestiveness in his mathematical studies and the inhibition of sense by the excessive formalities of ordinary mathematics instruction." Prof. Franklin also raises certain objections to the syllabus definition of differentials, but we are sorry to see that he himself perpetuates the worst defects of our text-books by expanding series of powers of differentials. It is, of course, possible to expand $f(x+dx)-f(x)$ in powers of dx, and when the result is divided by dx the limit of the series does happen to be *equal* to the differential coefficient in most cases, but the differential coefficient cannot be *defined* as the limit of the series in question. It would be equally legitimate to expand $f(x)-f(x-dx)$ or $f(x+\frac{1}{2}dx)-f(x-\frac{1}{2}dx)$. The notion of a differential coefficient depends essentially on the assumption that the ratio of $f(x_2)-f(x_1)$ to x_2-x_1 tends to a unique limit when x_2 and x_1 both tend to the same finite limit x. Further, we think it would be much better to follow Newton's example by defining equality of differentials instead of trying to define the differentials themselves. The student who is taught always to *add* dx on to the end of x fails to grasp the very foundation of the calculus. The failing cases may be exemplified by "density" at a point *on* the surface separating two media.

WE have pleasure in directing attention to the little volume entitled "Manchester in 1915," which has been issued (in Manchester by the University Press, and in London by Messrs. Longmans and Co.) at one shilling net, it being the handbook for the forthcoming meeting of the British Association. While less pretentious than many previous association handbooks, it is a noteworthy production, and one which should be of great service to those attending the meeting; it will doubtless also appeal to many residents in and adjacent to Manchester, for it contains some very readable and informing articles on institutions of, and matters pertaining to, the city; thus, a brief historical sketch is contributed by Prof. J. Tait; Prof. Tout deals with the University, Dr. Tattersall with the museum, Mr. H. Guppy with the John Rylands Library, and Prof. Hickson with the Literary and Philosophical Society. Mr. Spurley Hey has two articles on, respectively, elementary education in Manchester, and secondary schools in Manchester, and Mr. J. H. Reynolds deals with the evening-school system of Manchester. In addition to the foregoing, the volume is finely illustrated by some fourteen plates—one in colour. Both text and illustrations are beautifully printed.

THE Institute of Chemistry proposes to issue a special edition (limited to 100 copies) of the history of the institute, 1877–1914, and orders for it can now be received. Any profit arising out of its sale will be devoted to the building fund

MR. W. H. DINES informs us that a mistake occurs in his letter in NATURE of August 12 on "The Probable Error of the Amplitudes in a Fourier Series obtained from a Given Set of Observations." The passage in question should read:—"To obtain p we write $np/2=y_0 \sin 0+y_1 \sin \frac{2\pi}{n}$. . . . etc., instead of $p=y_0 \sin 0$ . . . .

OUR ASTRONOMICAL COLUMN.

ABSOLUTE STELLAR MOTIONS.—*Meddelande* No. 65, from the Lunds Astronomical Observatory, gives an account of an important statistical study of the distribution of the absolute motions of a number of parallax stars which has been made by Mr. K. W. Gyllenberg. After excluding parallaxes smaller than 0·015″, there remain 160 stars for which absolute velocities can be determined. The components were calculated for an axis "Z" pointed to the galactic pole, an "H" axis in the plane of the Milky Way, whilst the third "Ξ" was directed towards the vertex found for 1470 stars with known radial velocities. The numerical work was curtailed by using Prof. Charlier's plan of dividing the sky into forty-eight compartments, and using the co-ordinates of the centres for the contained stars. Prof. Charlier's units Siriometer (1 Sm $=10^6$ dist. earth-sun) and Stellar-year (1 St. $=10^6$ years) have been used (1 Sm/st. $=4{\cdot}7375$ km./sec.). After arranging the material according to type of spectrum, five star types, K1 (Arct.) to A2p (Cyg.), were excluded as having excessive velocities. The greatest mean velocities were found in the plane of the galaxy, the "Z" components giving the smallest mean value. The absolute velocities tend to increase as the parallax diminishes, but the increase is more rapid for the small parallaxes, probably due to the greater insecurity of these measures. Hence in the final stage of the work stars having parallaxes less than 0·025″ were excluded. It is concluded that the distribution of the absolute velocities for the remaining 144 stars is approximately represented by an ellipsoid of revolution flattened in the plane of the Milky Way, and, unlike the proper motions or radial velocities, the absolute motions show no principal vertex.

THE SOLAR ECLIPSE OF APRIL 17, 1912.—We have received copies of two papers by Señor P. Carrasco, of the Madrid Observatory, reprinted from the Annals of the Physical and Chemical Society of Spain, dealing with the above eclipse. One of these papers (*Ann.*, vol. xii., pp. 482–99, 1914) gives a general description of the eclipse and of the work done at Cacabelos (Leon) by Señor Carrasco, who had charge of the spectroscopic work in the eclipse party under Señor Cos, organised by the Institute of Geography and Statistics. The central line of totality, it is estimated, passed about 2700 metres south-east from the position occupied at Cacabelos (3° 1′ 39″ W., Madrid, 42° 35′ 53″ N.). The observers saw something rather less than totality, but more than a mere partial phase. In the second paper (*Ann.*, vol. xiii., pp. 181–238, 1915) the spectroscopic observations are discussed. The prismatic camera employed had "two (?) quartz prisms of 60° angle, 48 mm. in height, with an objective of 50 mm. aperture and 630 mm. f.l." *Five* exposures were made in *ten* seconds on one plate (Agfa), 13 × 18 cm. Three of these spectra have been measured and reduced (Cornu-Hartmann formula, Rowland's solar wave-lengths, and Kayser's Hauplinien). The results are given in a table of some 2000 chromospheric lines between λλ3334 and 5897. The ultra-violet region to λ3900 has been mapped. The conclusions reached are in good accord with those now generally accepted; thus, although Fraunhofer lines are common to both spectra, yet the intensities are notably distinct, the larger chromospheric arcs agreeing better with the spark than the arc spectrum, and the principal lines of the high chromosphere correspond with the enhanced lines of Sir Norman Lockyer.

ANOMALOUS DISPERSION IN THE SUN.—Last year Prof. Julius, by a development of the theory of anomalous dispersion, concluded that there must be